ONTARIO MINISTRY OF ENVIRONMENT
3693600024485

1970

OPERATING SUMMARY

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PRESTON

water pollution control plant

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ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

TD
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P748
1970

Preston : water pollution control plant.
81792

Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.

D. S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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Operations Engineer
B. W. Hansler

135 St. Clair Avenue West
Toronto 195

PRESTON

water pollution control plant

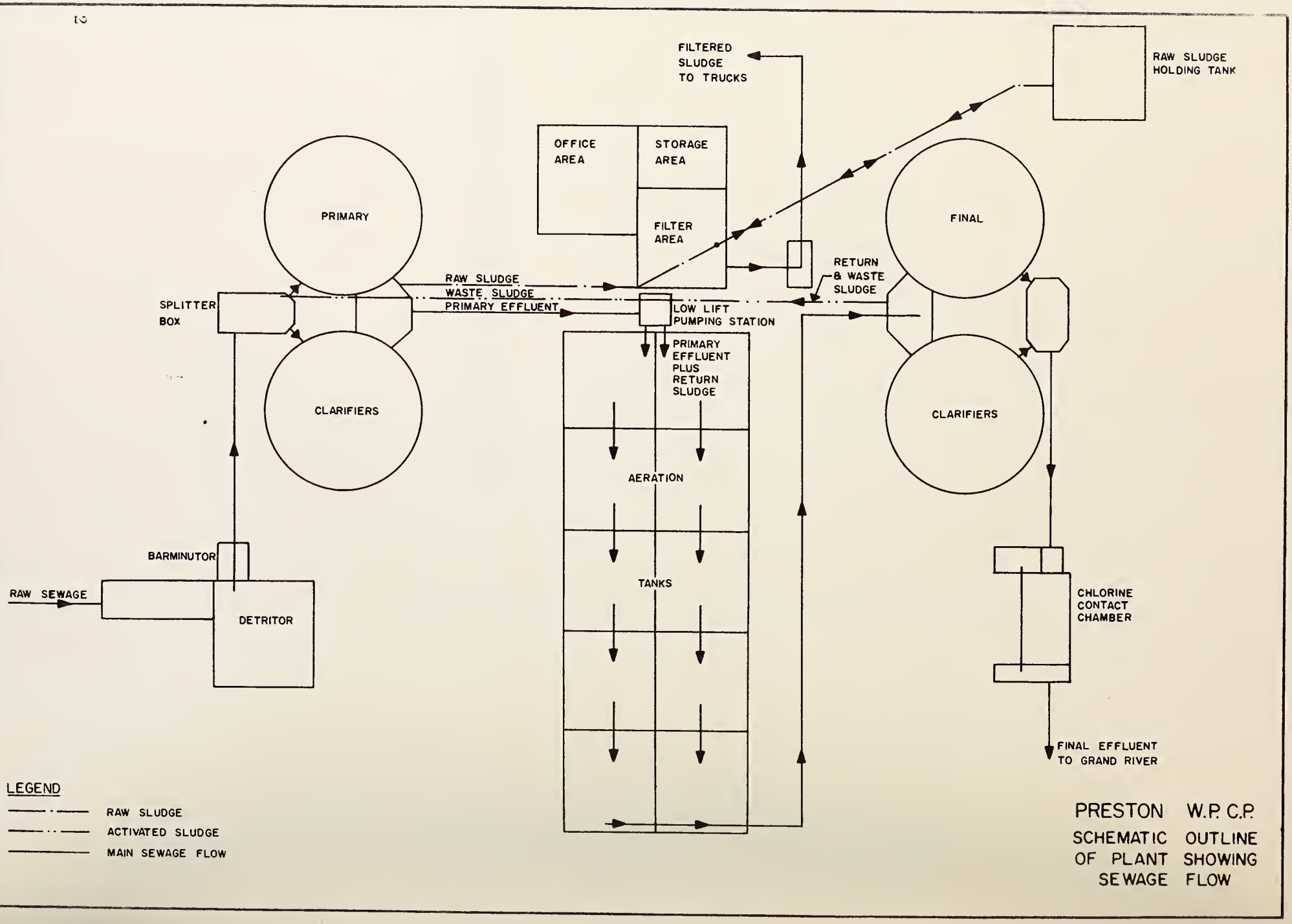
operated for

THE TOWN OF PRESTON

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY


FILTERED
SLUDGE
TO TRUCKS
RAW SLUDGE
HOLDING TANK
OFFICE
AREA
STORAGE
AREA
FILTER
AREA
PRIMARY
FINAL
RETURN
& WASTE
SLUDGE
RAW SLUDGE
WASTE SLUDGE
PRIMARY EFFLUENT
SPLITTER
BOX
LOW LIFT
PUMPING STATION
PRIMARY
EFFLUENT
PLUS
RETURN
SLUDGE
CLARIFIERS
CLARIFIERS
AERATION
TANKS
BARMINUTOR
RAW SEWAGE
DETRITOR
CHLORINE
CONTACT
CHAMBER
FINAL EFFLUENT
TO GRAND RIVER
LEGEND
RAW SLUDGE
ACTIVATED SLUDGE
MAIN SEWAGE FLOW
PRESTON W.P.C.P.
SCHEMATIC OUTLINE
OF PLANT SHOWING
SEWAGE FLOW

DESIGN DATA

PROJECT NO.	2-0046-59	TREATMENT	Activated Sludge
DESIGN FLOW	1.8 mgd	DESIGN POPULATION	15,000
BOD - Raw Sewage	300 mg/l	SS - Raw Sewage	350 mg/l
- Removal	95%	- Removal	90%

PRIMARY TREATMENT

Grit Removal

Type: Dorr detritor
Size: One 20' x 20' x 1½' (3,740 gal)
Retention: 2.1 min

Comminution

Type: Barminutor
Size: Model C (36")

Primary Sedimentation

Type: Dorr
Size: Two 50' dia x 10' swd (246,000 gal)
Retention: 3.3 hr
Loading: Surface, 460 gal/ft^2/day
Weir, 5730 gal/ft/day

Sewage Lift Pumps

Type: Worthington
Size: Two 1800 gpm @ 17.4' tdh

SECONDARY TREATMENT

Aeration Tanks

Type: Mechanical; single-pass
Size: Two 150' x 30' x 13' (731,000 gal)
Retention: 9.8 hr

Aerators

- Ten Ames-Crosta

Secondary Sedimentation

Type: Dorr
Size: Two 50' dia x 10' swd (246,000 gal)
Retention: 3.3 hr
Loading: Surface, 460 gal/ft^2/day
Weir, 5730 gal/ft/day

CHLORINATION

Type: F & P
Size: One 400 lb/day

Chlorine Contact Chamber

Size: One 30' x 15' x 6' 8" (18,700 gal)
Retention: 15 min

OUTFALL

- to Grand River

SLUDGE HANDLING

Holding Tank

Size: One 20' x 20' x 11' (4.400 cu ft or 27,400 gal)

Vacuum Filter

Type: Komline-Sanderson
Size: One 250 sq ft

'70 REVIEW

FLOWS	DAILY FLOW mil gal	OCCURRING IN THE MONTH OF	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average	1.4	—	41.2	—
High	1.54	May	47.9	May
Low	1.19	February	33.4	February

GENERAL

The average daily flow for the year of 1.4 million gallons increased by 0.1 million gallons over 1969. In 1970 the plant treated a total of 494.5 million gallons of sewage at a total cost of $77,746.48. The operating cost per million gallons was $157.22 and the cost per pound of BOD removed was two cents.

During the last two months of the year, a phosphate removal program using iron salts was conducted at the plant. Discounting the initial plant upset, the total phosphate removal efficiency exceeded 90% and often reaching 97% with the total phosphate concentrations in the final effluent being less than 0.7 ppm and often decreasing to 0.5 ppm during this period. The phosphate removal program also reduced the vacuum filter dosage of iron salts, therefore, reducing the filter cost on a daily basis. From the results obtained, it can be concluded that the phosphate removal program was a success. The costs involved in this program were incurred by the 1970 operating budget. The program was terminated at the request of Council.

During the beginning of July the Preston Water Pollution Control Plant suffered serious operational problems due to large amounts of potato wastes entering the plant. Due to this upset at the plant there were extra costs incurred due to excessive labour, sludge haulage, equipment and travel. After this major problem was resolved, there were no excessive potato wastes received at the plant causing any further upsets in the operation of the plant.

PLANT FLOWS and CHLORINATION

The average daily flow of 1.4 million gallons increased approximately 8% from 1969. The daily design flow of 1.8 million gallons was exceeded 3% of the time.

Despite the increase in flow, the amount of grit removed decreased to an average of 107 cubic feet per month. The average dosage rate required to produce a chlorine residual of 0.5 mg/l after a 15 minute contact time was 6.1 mg/l.

PLANT EFFICIENCY

The raw sewage BOD averaged 671 mg/l with a design raw sewage BOD concentration of 300 mg/l being exceeded 80% of the time.

The raw sewage suspended solids averaged 1,187 mg/l with a design raw sewage suspended solids of 350 mg/l being exceeded all the year, similar to the situation in 1969. Although a by-law prohibiting the discharge of sewage containing more than 350 mg/l of BOD and suspended solids was initiated in 1960, the loadings on the plant have increased since this period. The average raw sewage BOD content of 671 mg/l is approximately 220% of the design value while the suspended solids concentration of 1,187 mg/l is approximately 340% of this value.

The average BOD and suspended solids in the effluent were 19 mg/l and 16 mg/l respectively. Reductions of 97% and 99% were experienced in the BOD and suspended solids removal. Although the extent of reductions in BOD and suspended solids achieved were extremely good, the effluent still exceeded the OWRC objectives 50% in BOD and 40% for suspended solids in 1970. This is a consequence of the abnormally high strengths of the raw sewage.

SLUDGE DIGESTION and DISPOSAL

The high organic loading on the plant was reflected in the amount of sludge requiring disposal. A total of 8,237 cubic yards of liquid sludge and 4,922 cubic yards of sludge dewatered by vacuum filtration were hauled from the plant during 1970.

VACUUM FILTRATION

The vacuum filter was operated for 1054.3 hours in 1970. The average total raw sludge solids content was 9.6% while the average filtered solids content was 25% in 1970. The dosage of lime was 10.4% and ferric chloride dosage was 3.1%.

CONCLUSIONS and RECOMMENDATION

From the results obtained from the phosphate removal program, it is indicated that iron salts can be used for phosphate removal when applied to the plant influent.

Considering the very high organic loading, mainly due to industry in the Town, and the increase in hydraulic loading, the plant maintained a very high degree of efficiency during the year indicating excellent control of the plant process. The plant expansion is anticipated to start in 1971. Upon this completion, a decrease in concentration of BOD and suspended solids in the effluent is expected, thereby meeting the OWRC's objectives of 15 mg/l for both BOD and suspended solids.

The Town of Preston should keep a very close surveillance on the industrial waste prodcuts from Hostess Food Products Limited to ensure that the Industrial Waste By-law conditions are being satisfied.

PROJECT COSTS

STAGE I NET CAPITAL COST (Final)	$147,617.75
DEDUCT - Portion financed by CMHC/MDLB (Final)	-
Long Term Debt to OWRC	$147,617.75
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	$ 39,769.62
Net Operating	-
Debt Retirement	$ 2,979.00
Reserve	584.68
Interest Charged	8,270.46
TOTAL	$ 11,834.14

RESERVE ACCOUNT

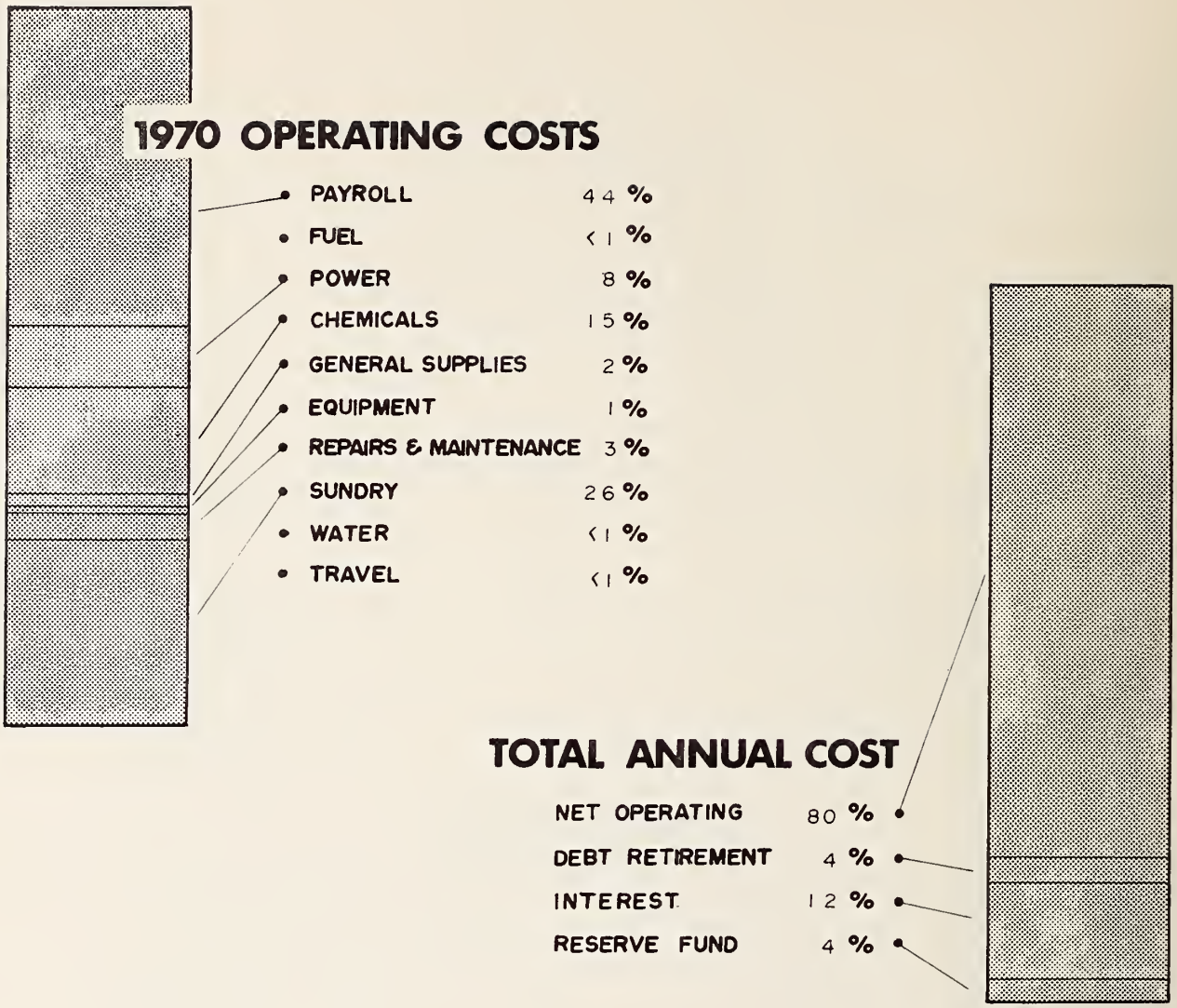
Balance @ January 1, 1970	$ 9,639.88
Deposited by Municipality	584.68
Interest Earned	574.42
	$ 10,798.98
Less Expenditures	1,455.11
Balance @ December 31, 1970	$ 9,343.87

PROJECT COSTS

STAGE II	
NET CAPITAL COST (Final)	$647,993.44
DEDUCT - Portion financed by CMHC/MDLB (Final)	432,072.28
Long Term Debt to OWRC	$215,821.16
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	$ 42,843.48
Net Operating	$ 77,746.48
Debt Retirement	4,357.00
Reserve	3,434.75
Interest Charged	12,097.25
TOTAL	$ 97,635.48

RESERVE ACCOUNT

Balance @ January 1, 1970	$ 25,240.39
Deposited by Municipality	3,434.75
Interest Earned	1,713.26
	$ 30,388.40
Less Expenditures	-
Balance @ December 31, 1970	$ 30,388.40



Yearly Operating Costs

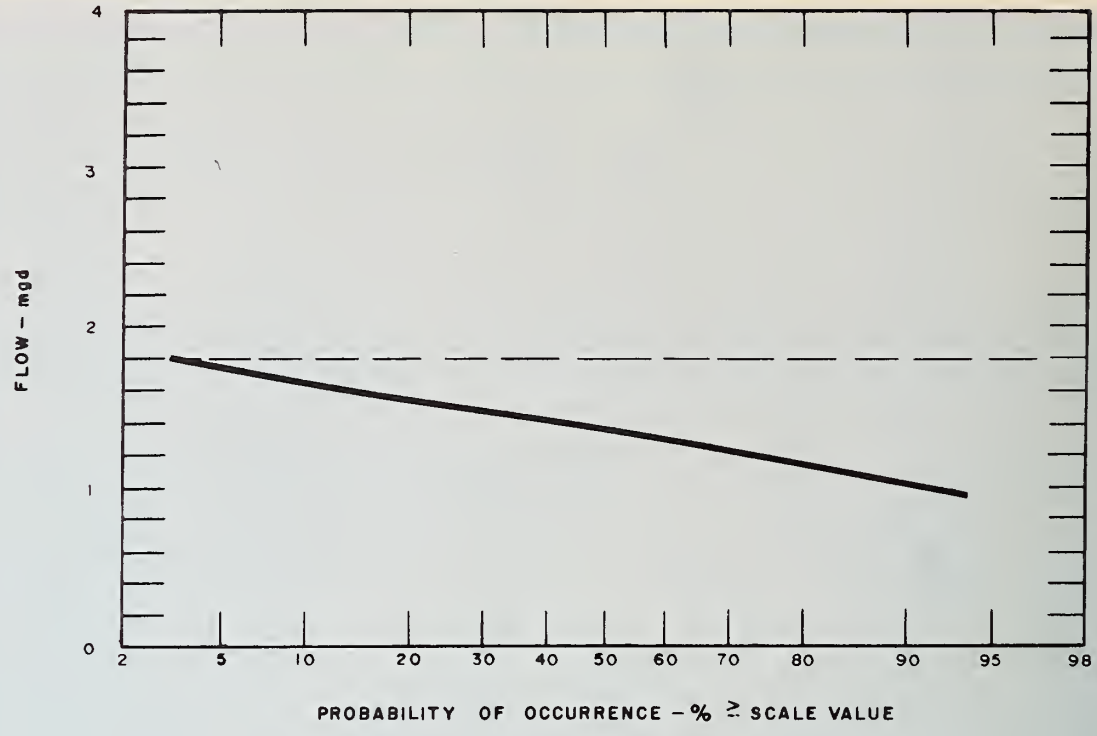
YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	336.95	$43,359.79	$128.68	3 cents
1967	421.18	50,152.64	119.08	3 cents
1968	547.38	61,420.06	112.21	3 cents
1969	479.3	62,603.47	130.61	2 cents
1970	494.5	77,746.48	157.20	2 cents

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	7100.70	3507.47	-	-	514.85	1045.15	63.11	28.19	327.09	1549.80	65.04	-
FEB	4517.05	2506.16	-	134.84	525.11	-	45.08	-	13.34	1256.37	-	36.15
MAR	6156.82	2547.96	-	-	529.98	1578.58	70.51	47.04	-	1317.71	65.04	-
APR	4346.74	2485.99	-	115.06	550.99	276.05	84.95	263.38	-	525.92	-	44.40
MAY	6942.82	2747.87	-	-	502.00	552.10	753.36	209.11	94.50	2016.43	67.45	-
JUNE	3683.07	2491.99	158.38	-	475.53	-	137.72	-	308.19	71.56	-	39.70
JULY	9065.58	2416.44	465.10	-	475.53	1678.61	881.19	168.32	450.86	2367.20	67.83	94.50
AUG	7371.28	3741.39	583.81	-	530.49	1727.10	65.65	-	97.74	625.10	-	-
SEPT	5103.88	2494.01	-	-	467.45	-	1056.27	-	41.53	951.21	68.21	25.20
OCT	5905.85	2425.46	-	-	502.44	580.55	171.61	-	339.71	1886.08	-	-
NOV	7279.58	2730.43	-	-	-	2817.71	(2127.63)	-	179.98	3586.94	-	92.15
DEC	10273.11	2415.73	-	70.12	1026.54	1930.91	292.73	-	112.13	4293.59	63.26	68.10
TOTAL	77746.48	32510.90	1207.29	320.02	6100.91	12186.76	1494.55	716.04	1965.07	20447.91	396.83	400.20

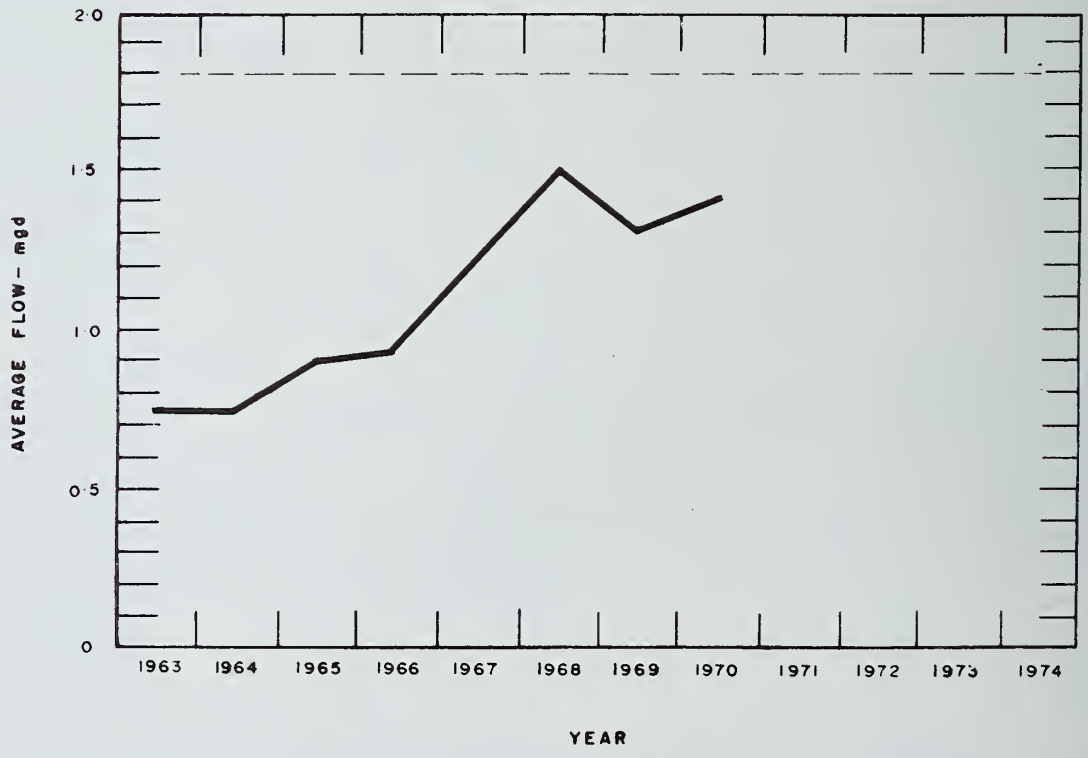
BRACKETS INDICATE CREDIT

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE $ 7690.20 - Liquid
$10124.40 - Filtered



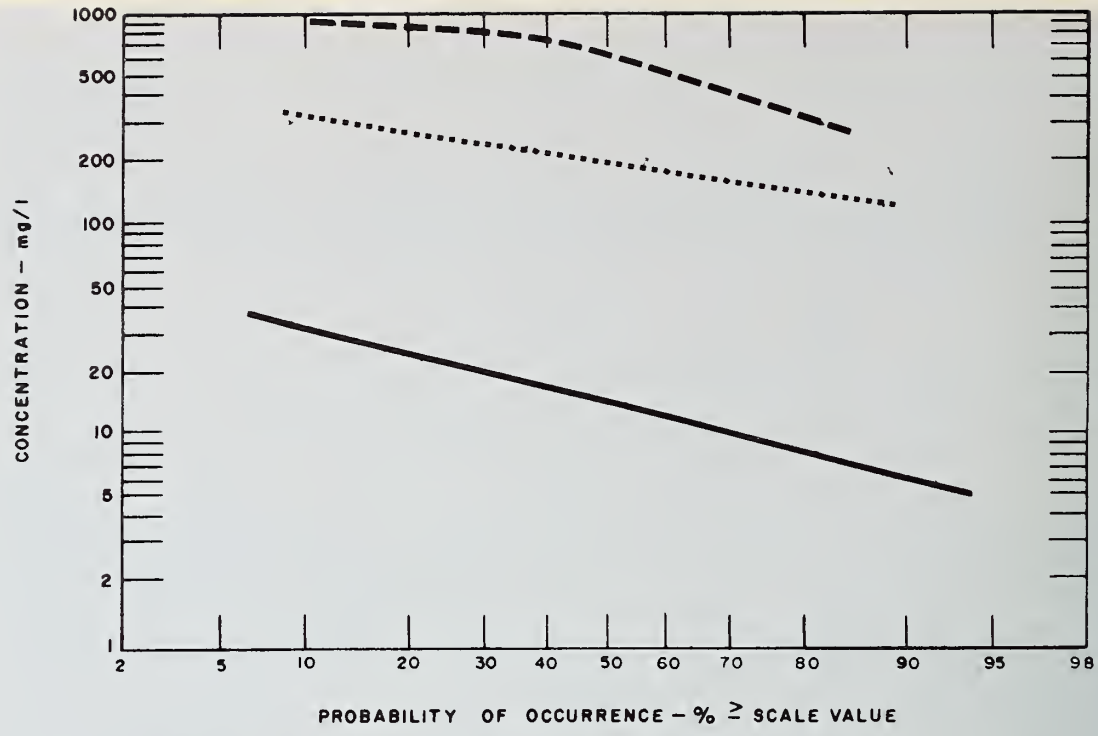
FLOWS

NOMINAL CAPACITY

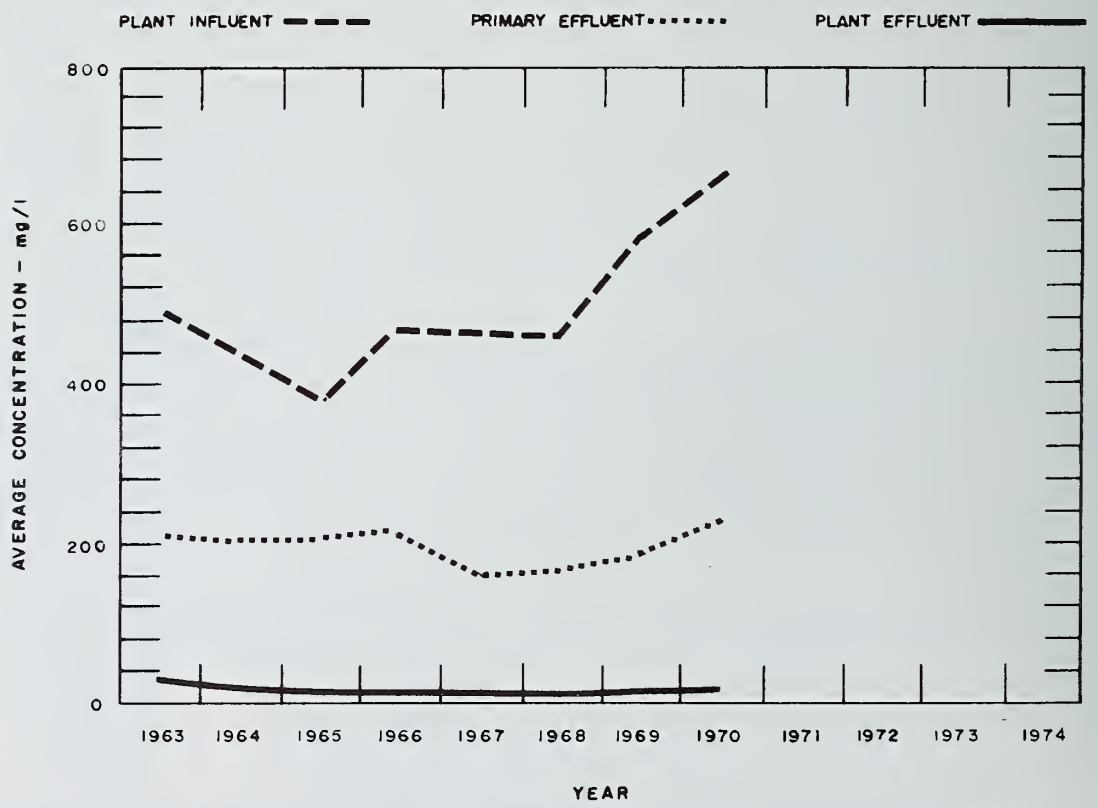


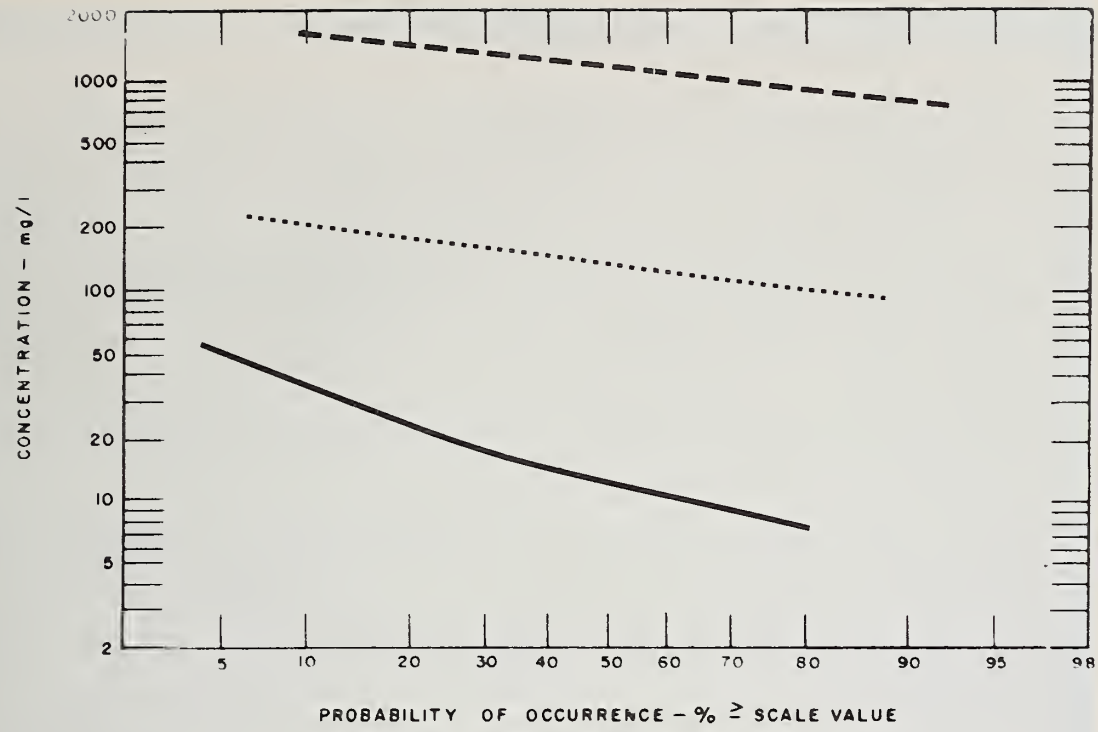
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10^3 pounds	DOSAGE mg/l
JAN	36.9	1.19	1.6	.9	2.3	6.3
FEB	33.4	1.19	1.4	.8	2.2	6.6
MAR	38.7	1.25	1.5	1.3	2.4	6.2
APR	41.9	1.40	1.7	1.0	2.4	5.7
MAY	47.9	1.54	2.1	1.0	2.5	5.2
JUNE	44.3	1.48	1.9	.9	2.4	5.4
JULY	45.4	1.46	1.9	1.0	2.8	6.3
AUG	37.8	1.22	1.5	.8	2.6	6.9
SEPT	41.2	1.38	1.7	.9	2.7	6.6
OCT	42.9	1.38	1.6	1.0	2.6	6.1
NOV	38.8	1.28	1.6	1.0	2.6	6.8
DEC	45.3	1.46	1.9	1.0	2.4	5.3
TOTAL	494.5	-	-	-	30.0	-
AVERAGE	-	1.4	2.1	.8	-	6.1

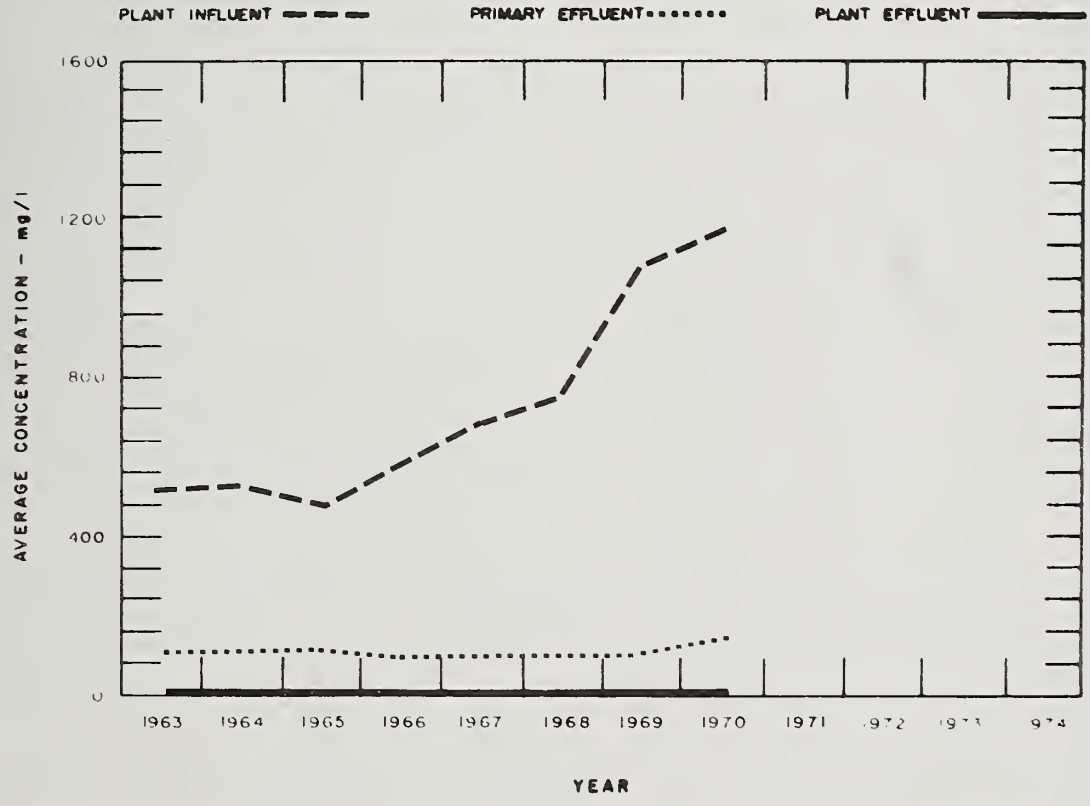


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



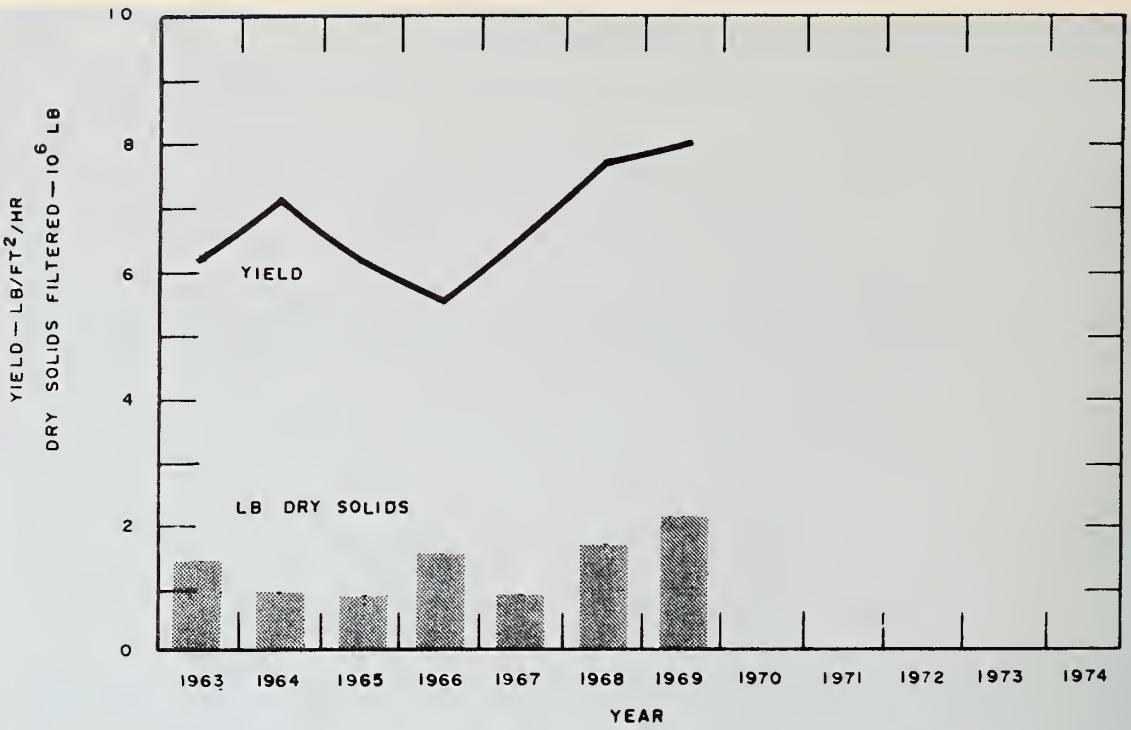
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED
	INFLUENT		EFFLUENT		REDUCTION		INFLUENT		EFFLUENT		REDUCTION		
	n	mg/l	n	mg/l	%	10^3 pounds	n	mg/l	n	mg/l	%	10^3 pounds	cu ft
JAN	2	485	2	13	97	170	20	1025	19	18	98	370	116
FEB	2	440	2	16	96	140	22	1149	22	11	99	380	87
MAR	2	725	2	7	99	280	21	1437	20	13	99	550	73
APR	1	800	2	24	97	320	20	1514	21	19	99	630	83
MAY	6	1401	6	10	98	670	16	1427	16	11	99	680	66
JUNE	1	550	1	17	97	240	14	1069	14	11	99	470	46
JULY	1	1200	1	17	99	540	16	1256	16	23	98	560	292
AUG	3	756	3	10	99	280	18	1130	18	11	99	420	102
SEPT	2	750	2	18	98	300	16	1029	16	9	99	420	144
OCT	7	578	1	16	97	240	14	881	14	8	99	370	101
NOV	21	530	15	27	95	195	35	1150	31	33	97	433	99
DEC	5	472	5	13	97	208	19	1086	19	16	99	485	74
TOTAL	53	–	41	–	–	3583	231	–	226	–	–	5768	1283
AVERAGE	–	671	–	19	97	–	–	1187	–	16	99	–	–

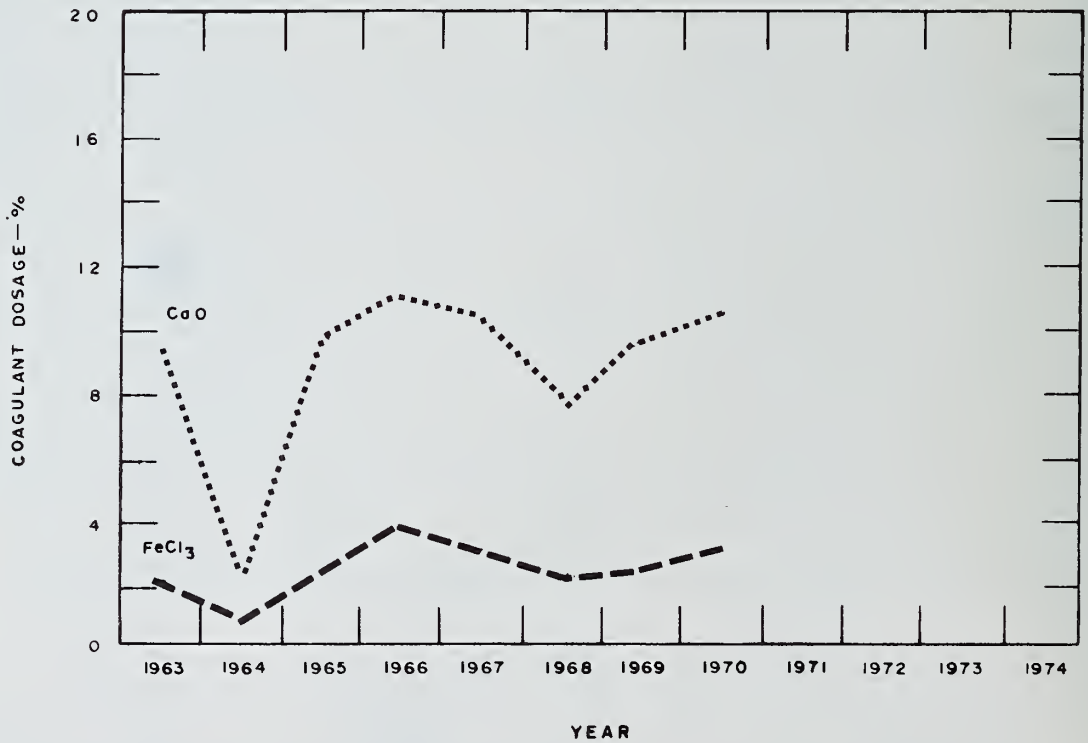
NOTE – n is the number of samples taken.

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF. BOD mg/l	AERATION INF. SS CONCN mg/l	SECONDY. EFF. BOD mg/l	SECONDY. EFF. SS CONCN mg/l	MLSS CONCN mg/l	F/M lb BOD / lb MLSS	AIR USED 1000 cu ft / lb BOD	WASTE SLUDGE 10^3 lb/day
JAN	1.2	147	142	8	21	1310	.19	-	.9
FEB	1.2	285	169	12	22	1600	.30	-	1.1
MAR	1.2	386	167	9	15	2620	.26	-	1.3
APR	1.4	230	200	23	21	2820	.16	-	2.2
MAY	1.5	183	152	12	13	2820	.14	-	2.9
JUNE	1.5	340	142	20	12	2620	.27	-	2.8
JULY	1.5	120	155	11	21	1520	.16	-	1.5
AUG	1.2	243	110	9	12	1480	.29	-	1.3
SEPT	1.4	250	100	26	11	1370	.35	-	1.0
OCT	1.4	240	122	12	10	1390	.34	-	1.0
NOV	1.3	185	216	-	31	1480	.24	-	1.1
DEC	1.5	230	170	-	19	1780	.26	-	1.3
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	1.4	237	154	14	17	1900	.25	-	1.6



VACUUM FILTRATION



VACUUM FILTRATION

MONTH	TOTAL FILTER USE hr	SLUDGE		CONDITIONING CHEMICALS						FILTER CAKE	FILTR.	YIELD
		TOTAL SOLIDS %	DRY SOLIDS 10^3 lb	CaO		$FeCl_3$		POLYMER				lb/hr / sq ft
				USED 10^3 lb	DOSE %	USED 10^3 lb	DOSE %	USED lb	DOSE ppm	% TS	% TS	
JAN	57	6.4	98.9	11.7	11.8	3.5	3.5	0	0	21	1.2	7.0
FEB	79	7.1	141.2	17.4	12.3	5.2	3.7	0	0	21	1.2	7.2
MAR	78	9.9	146.7	17.8	12.1	5.1	3.5	0	0	25	1.0	7.6
APR	78	12.3	167.1	18.4	11.0	5.4	3.2	0	0	26	1.2	8.6
MAY	105	11.9	227.6	22.6	9.9	7.3	3.2	0	0	25	1.2	8.7
JUNE	100	10.8	215.3	20.6	9.6	6.1	2.8	0	0	24	1.1	8.7
JULY	61	9.0	117.3	12.7	10.8	3.6	3.1	0	0	23	1.1	7.8
AUG	87	9.7	176.0	17.4	9.9	6.3	3.6	0	0	24	1.2	8.1
SEPT	101	9.3	233.6	19.7	8.4	7.0	3.0	0	0	28	1.0	9.3
OCT	99	9.3	193.2	18.7	9.7	6.5	3.4	0	0	26	1.2	7.9
NOV	93	9.9	173.5	15.7	9.0	4.1	2.4	0	0	27	1.1	7.6
DEC	117	9.4	202.5	21.5	10.6	4.7	2.3	0	0	24	1.4	6.9
TOTAL	1055	-	2092.9	214.2	-	64.8	-	0	0	-	-	-
AVERAGE	88	9.6	174.4	17.9	10.4	5.4	3.1	0	0	25	1.2	8.0

SLUDGE DISPOSAL

MONTH	RAW SLUDGE			SLUDGE DISPOSAL	
	VOLUME 10^3 gal	TOTAL SOLIDS %	VOL SOLIDS %	DEWATERED cu yd	LIQUID cu yd
JAN	270	6.5		-	805
FEB	330	7.1		-	917
MAR	230	10.5		408	550
APR	200	12.4		454	517
MAY	230	10.9		590	165
JUNE	260	10.8		540	440
JULY	350	8.0		330	1896
AUG	190	9.6		470	615
SEPT	260	9.2		610	154
OCT	300	9.2		510	528
NOV	281	9.4		460	726
DEC	354	9.3		550	924
TOTAL	3255	-		4922	8237
AVERAGE	-	9.4		-	-

Date Due

Water management in Ontario